

Textile Strain Measurement System, Phase I

Completed Technology Project (2018 - 2019)



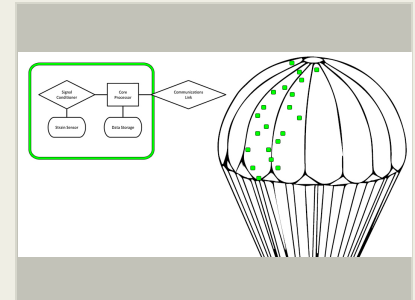
Project Introduction

Current evaluations of stress in textile parachute structures rely heavily on analytical estimation without adequate data collection means to validate or improve simulations. Features of available data acquisition tools are too limited to facilitate "live" stress measurement of parachute textiles in operation. Advancements in microelectronics and electronics infused "E-textiles" can be employed in combination to create the critically needed data collection tools for use on parachutes in operation, with continued innovation required to expand capability to also include parachute deployment and inflation stages. The current concept for this proposal, hereinafter referred to as the Textile Strain Measurement System or TSMS, is anticipated to produce a data acquisition system that meets the Topic Z11.01: "... advanced sensors, sensor systems ... to perform inspections on large complex structures... for potential use on free-flying inspection platforms." The planned sensor system includes design of a directly measuring data recorder, with size and mass goals to remain non-influential to the parachute material's natural movement and dynamic characteristics. The latest advancements in microelectronics will be exploited to achieve the miniaturization goals. The proposed effort includes investigation and characterization of various strain sensitive materials suitable for stress measurement of multiple textile high and low elongation categories. The resulting TSMS innovation is a combined design of recorder with strain measurement materials specific to textile decelerator configurations that can be utilized in an efficient and non-invasive manner.

Anticipated Benefits

Wide range of mission applications that include textile structures or subsystems including: aerial decelerator systems, inflatable antennas, inflatable habitats, etc.

All textile structure applications and investigations can use this innovation. For decelerator applications include: aircraft and UAV development, ejection seat and emergency parachutes, cargo aerial delivery, and munitions descent and guidance. Potential exists for applications in "smart textiles" and "wearable technology" markets.



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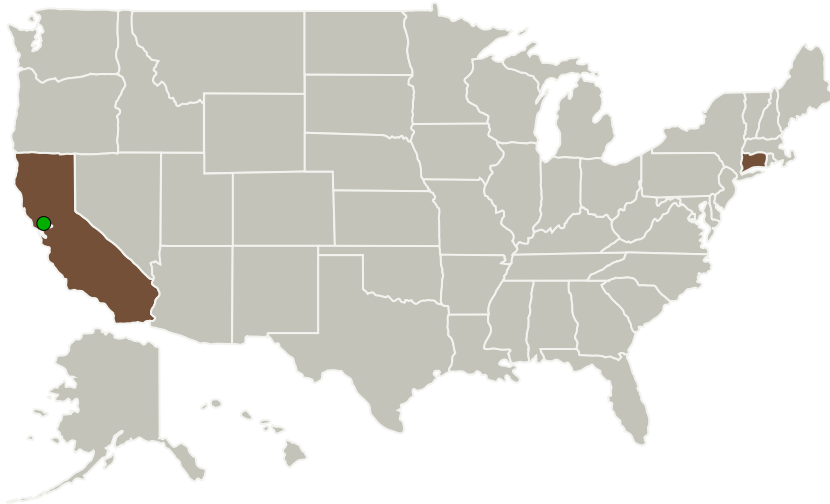
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Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|-------------------------------|-------------------------|-------------|---------------------------|
| Katabasis Engineering, LLC | Lead Organization | Industry | Glastonbury, Connecticut |
| ● Ames Research Center(ARC) | Supporting Organization | NASA Center | Moffett Field, California |

Primary U.S. Work Locations

| | |
|------------|-------------|
| California | Connecticut |
|------------|-------------|

Project Transitions

▶ **August 2018:** Project Start

✓ **February 2019:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138025>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Katabasis Engineering, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

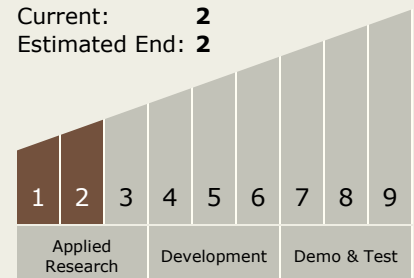
Carlos Torrez

Principal Investigator:

Allen Witkowski

Technology Maturity (TRL)

Start: **1**
 Current: **2**
 Estimated End: **2**

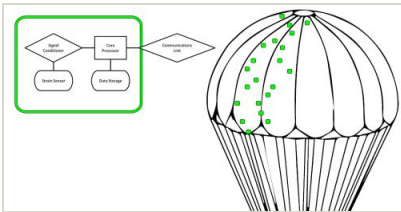


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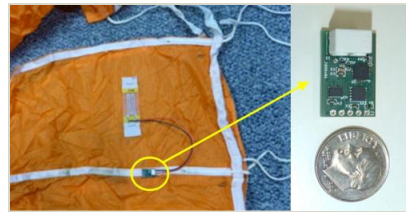
Images



Briefing Chart Image

Textile Strain Measurement System, Phase I

(<https://techport.nasa.gov/image/136152>)



Final Summary Chart Image

Textile Strain Measurement System, Phase I

(<https://techport.nasa.gov/image/133301>)

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
 - └ TX09.4 Vehicle Systems
 - └ TX09.4.6 Instrumentation and Health Monitoring for EDL

Target Destinations

Earth, The Moon, Mars